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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,097	01/20/2004	Berthold Hahn	5367-252PCON.	4556

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EXAMINER

TRINH, MICHAEL MANH

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 09/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/762,097

Applicant(s)

HAHN ET AL.

Examiner

Michael Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

\*\*\* This office action is in response to Applicant's Amendment and RCE filed August 21, 2006. Claims 1-17,34 are pending. Claims 18-33 were canceled by Applicant.

\*\*\* The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Rejections - 35 USC § 102*

1. Claims 1,3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26).

Re claim 1: Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device (page 24, last 7 lines) comprising at least the steps of: forming at least one compound semiconductor layer based on gallium nitride and being an active layer or a part of an active layer sequence of the light emitting device (page 24, last 7 lines, pages 25,27); and setting growth parameters used during production of the compound semiconductor layer such that, at least in some cases in a vicinity of dislocations in the compound semiconductor layer, regions are produced in the compound semiconductor thickness than remaining regions of the layer having a lower compound semiconductor layer (Fig 4, page 28), and, re claim 1, so as to build up a shielding energy barrier in the regions having the lower thickness more than the other remaining regions, inherently. Re claim 3, the regions are formed with the lower thickness to be less than half as thick as the remaining regions of the compound semiconductor layer (as shown in Figure 4b; page 28). Re claim 4, wherein the compound semiconductor layer is formed from an  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$  compound semiconductor, where  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$  and  $x+y \leq 1$  (page 24, last 7 lines; Abstract; page 25). Re claim 5, wherein AlGaN is provided when  $x=0$  in the  $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$  (page 24, last 7, lines).

### *Claim Rejections - 35 USC § 103*

2. Claims 2,6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26) taken with Applicant's admitted prior art (present specification page 1-3).

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Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device as applied to claims 1,3-5 above. Re claim 12, wherein the substrate includes sapphire (page 25, left column, lines 14-20).

Re claim 2, Kawaguchi teaches forming a light emitting device (LED), but lacks detailing about forming a first coating layer and second coating layer as in claim 2. Re claims 7-8, the first and second coating layer including  $\text{Ga}_u\text{Al}_{1-u}\text{N}$ . Re claim 9, MOCVD for depositing the coating layers. Re claim 10, including a buffer layer on the substrate. Re claim 11, the buffer layer include  $\text{Ga}_m\text{Al}_{1-m}\text{N}$ .

However, re claim 2, Applicant's admitted prior art teaches (at specification page 2, line 6 through page 3) forming a first coating layer formed from a compound semiconductor based on gallium nitride of a first conductivity type on the substrate; forming the compound semiconductor layer, as a light-emitting layer, over the first coating layer; and forming a second coating layer formed from a compound semiconductor based on gallium nitride of a second conductivity type over the light-emitting layer, a composition of the compound semiconductor layer based on gallium nitride differing from a composition of the compound semiconductor of the first and second coating layers (present specification page 2, lines 6-26); wherein, re claims 7-8, the first and second coating layer include AlGaN layer (present specification page 2, lines 20-25); wherein, re claim 9, MOCVD is used for depositing the coating layers; and wherein, re claims 10-11, a buffer layer of GaN ( $m=1$ ) is formed on the substrate, and wherein the first coating layer is formed on the buffer layer (present specification page 2, lines 20-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the light emitting device of Kawaguchi by forming a first coating layer and a second coating layers of AlGaN layer with a buffer layer on the substrate as taught by Applicant's admitted prior art. This is because of the desirability to form a high power structure blue and violet light emitting diode device.

Re claim 6, Kawaguchi does not detail about doping with foreign substance.

However, Applicants' admitted prior art also teaches (at present specification page 3, lines 22-25) doping the light-emitting layer with a p-type foreign substance and/or an n-type foreign substance to improve the luminance.

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the light emitting device of Kawaguchi by doping the light-emitting layer with a p-type foreign substance and/or an n-type foreign substance as taught by Applicant's admitted prior art. This is because of the desirability to improve the luminance of the light emitting device.

3. Claims 13-17,34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawaguchi et al (Article title "The formation of crystalline defects...", 1998, pp 24-26) taken with Mukai (Article title "InGaN-Based Blue Light Emitting Diodes..." L839-841).

Kawaguchi teaches (at pages 24-28) a method for forming a light-emitting device as applied to claims 1,3-5 above, wherein re claim 34, wherein forming the at least one compound semiconductor includes forming the active layer or a part of the active layer of the light emitting device (page 24, last 7 lines, pages 25,27).

Re claims 13-17, Kawaguchi teaches forming an active layer, but lacks mentioning, re claim 13, the active layer sequence with a quantum film structure, re claim 14, including at least one GaN quantum film; re claim 15, as an InGaN/GaN quantum film structure; re claim 16, with at least one undoped GaN quantum film; and re claim 17, with a GaN quantum film or with an intrinsic GaN quantum film.

However, Mukai teaches (at Figure 1; page L839) forming a light emitting diodes including an active layer sequence with a quantum film (single quantum well , SQW, re claim 13), wherein the quantum film includes at least one GaN quantum film (re claim 15), wherein the quantum film structure includes an InGaN/GaN (Figure 1; re claim 16); wherein the quantum film includes at least one undoped GaN quantum film (Figure 1, re claim 17); and wherein the quantum film includes a GaN quantum film as an intrinsic GaN quantum film (Figure 1, re claim 18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the light emitting device of Kawaguchi by forming the active layer sequence with the single quantum film as taught by Mukai above. This is because of the desirability to form a highly efficient blue/green InGaN singly quantum well structure light emitting diodes (LED).

***Response to Amendment***

4. Applicant's remarks filed August 21, 2006 with respect to claims 1-17,34 have been considered but are moot in view of the new ground(s) of rejection.

Applicant remarked that "...forming a shielding energy barrier...is not disclosed in Kawaguchi...", as "...the indium mole fraction is higher in the regions of greater thickness...".

In response, this is noted and found unconvincing. First, ***claimed subject matter, not the specification, is the measure of invention***. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In *Re Self*, 213 USPQ 1,5 (CCPA 1982); In *Re Priest*, 199 USPQ 11,15 (CCPA 1978).

Nowhere in the claimed invention as recited in base claim 1 requires any of indium mole fraction. Contrary to Applicant's remarks, Kawaguchi clearly discloses the claimed limitations by setting growth parameters to form region having a lower thickness than remaining regions of the compound semiconductor layer as claimed. In the absence of no objective evidence to prove to the contrary between the claimed invention as recited in base claim 1 and that of Kawaguchi, the reduction in the thickness of the compound layer near the vicinity of dislocations, as similarly disclosed by Kawaguchi, also causes to build up shielding energy barrier, inherently.

By growing to form the compound semiconductor layer as disclosed by Kawaguchi, which is *similar to the invention as claimed* in claim 1, in which in a vicinity of dislocations in the compound semiconductor layer, the compound semiconductor layer is formed with regions having lower thickness than remaining regions of the compound semiconductor layer so as to a shielding energy barrier is building up in the regions having the lower thickness more than the other remaining regions, inherently.

\*\*\*\*\*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

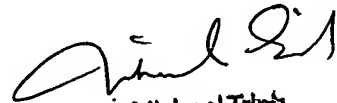
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Oacs-18



Michael Trinh  
Primary Examiner